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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/761,835 | 01/20/2004 | Jong-Kon Choi | 9903-086 | 4066 |

20575 7590 01/11/2006

MARGER JOHNSON & MCCOLLOM, P.C.
210 SW MORRISON STREET, SUITE 400
PORTLAND, OR 97204

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| EXAMINER |
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MITCHELL, JAMES M

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| ART UNIT | PAPER NUMBER |
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2813

DATE MAILED: 01/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/761,835

Applicant(s)

CHOI, JONG-KON

Examiner

James M. Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
- Paper No(s)/Mail Date 01/04

- 4) ☒ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. 6/30/05

- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This office action is in response to applicant's request for continued examination filed September 12, 2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (U.S. 5,936,758) in combination with Mullen (U.S. 5,241,133) and Zhao (U.S. 6,882,042).

Fisher (Fig 1) discloses:

(cl. 1, 6) a digital micro-mirror device (14; Col. 5, Lines 45-48) package, comprising: a base substrate (46) having a top surface and a bottom surface; an adhesive disposed on the top surface of the base substrate; a semiconductor chip (12) over the adhesive, and electrically connected (24) with the base substrate; one or more mirrors (14; Col. 5, Lines 45-48) mounted on the semiconductor chip; a hermetic sealing means (Abstract) covering the semiconductor chip including the one more mirrors;

(cl. 3) with the board ceramic (Col. 5, Lines 65-66);

Fisher does not show a copper metallic layer formed on a back surface of a chip, with the chip attached to the top surface of a substrate with a metallic adhesive.

Mullen (Fig 6) utilizes a copper metallic layer (60) on a back of a chip (through adhesive 67) with the chip attached to the top surface of a substrate with a adhesive. (64) and adhesive (68).

It would have been obvious to one of ordinary skill in the art to modify the package of Fisher by incorporating a copper metallic layer between the chip and adhesive in order to reduce stress as taught by Mullen (Col. 4, Lines 41-42).

Mullen does not appear to explicitly show that its adhesive is metallic of solder or that it is solid at room temperature.

However, Zhao teaches a metallic, low melting point¹ solder adhesive (Col. 7, Lines 16-17) that solid at room temperature.

It would have been obvious to one of ordinary skill in the art to form the adhesive in the modified structure including Mullen with solder of Zhao in order to form an adhesive as required by Mullen (68).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (U.S. 5,936,758), Mullen (U.S. 5,241,133) and Zhao (U.S. 6,882,042) as applied to claim 1 and further in combination with Akram (U.S. 2001/004564).

Neither Fisher, Mullen nor Zhao utilize a heat sink attached on the bottom surface of the base substrate.

¹ Same material claimed by applicant.

Akram (Fig. 10) utilizes a heat sink (340) attached on the bottom surface of the base substrate.

It would have been obvious to one of ordinary skill in the art to incorporate a heat sink attached on the bottom surface of the base substrate of the modified structure including Fisher in order to provide heat management as taught by Akram (Col. 7, Lines 57-60).

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coyle (U.S. 2001/0034083) in combination with Ommen et al. (U.S. 5,397,917).

Coyle (Fig 4A, 5A, 6A) discloses:

(cl. 1) a digital micro-mirror device package, comprising: a base substrate (201) having a top surface and a bottom surface; an adhesive disposed on the top surface of the base substrate (Par. 0057); a semiconductor chip (101) over the adhesive, and electrically connected (wires not labeled) with the base substrate; one or more mirrors (102) mounted on the semiconductor chip; a cap (601) covering the semiconductor chip including the one more mirrors;

(cl. 3) and the board consists of plastic (Par. 0055).

Coyle does not show a hermetic seal or copper metallic layer on the back of the chip and a metallic adhesive attached to the semiconductor chip and base.

Ommen utilizes a hermetic seal (Col. 7, Lines 35-36) and a copper metallic layer (Col. 2, Lines 40-42) between a chip (25) and adhesive (17).

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It would have been obvious to one of ordinary skill in the art to modify the chip attaching and covering means of Coyle by incorporating a hermetic cap and copper metallic layer between the chip and adhesive in order to provide an heat spreader as thereby dissipating heat and to prevent moisture penetration as taught by Ommen (Abstract & Col. 7, Lines 35-36).

Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Coyle (U.S2001/0034083) and Ommen et al. (U.S. 5,397,917) as applied to claim 1 and further in combination with Gondunsky et al. (U.S. 5,050,040).

Neither Coyle nor Ommen appear to show a heat sink attached to a bottom of the board.

Gondunsky (Fig.1) utilizes a sink (30) attached to a bottom of a board.

It would have been obvious to one of ordinary skill in the art to form a sink attached to a bottom of the modified board of Coyle in order to facilitate heat from a heat dissipating member as taught by Gondunsky (Col. 8, Lines 39-40).

Response to Arguments

Applicant's arguments filed September 12, 2005 have been fully considered but they are not persuasive. The gravamen of applicant's arguments is that he contends that the prior art does not show a metallic layer on the back of the chip with an adhesive attaching the chip to a substrate. Examiner disagrees. While applicant in his previous discussions as highlighted in the attached interview summary has indicated that the

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metallic layer claimed is directly attached to chip with no intervening material, applicant has failed to claim that feature². As such, applicant's claim of a metallic layer on a back of a chip is encompassed with the prior art's structure of a metallic layer on a back of a chip through an intervening adhesive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

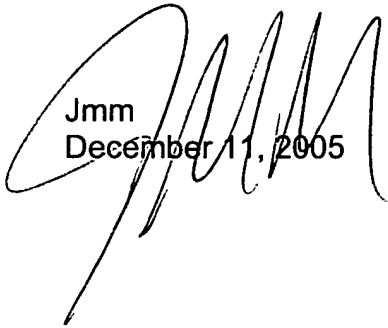
² Even if properly claimed, applicant must also show where the limitation is supported in the original disclosure.

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Jmm
December 11, 2005

A large, stylized handwritten signature in black ink, consisting of several loops and a long trailing stroke, is written over the typed text.